

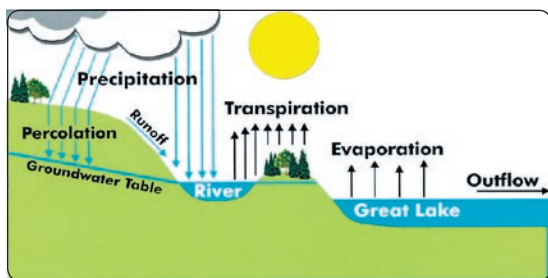
# Water Levels of the Great Lakes



Great Lakes water levels have fluctuated throughout their historical record. Levels of Lakes Michigan and Huron, for example, reached record highs in both 1886 and 1986. Lakes Michigan and Huron's record low water levels coincided with climatic events such as the Dust Bowl of the 1930's, a multi-continental severe drought of 1964 (which is the record low for the two lakes), and the most recent and strongest El Nino on record of 1997.

## Why Do Lake Levels Fluctuate?

Great Lakes water levels respond to changes in their water supplies, including precipitation falling on the lakes, the runoff from their tributaries' watershed, and evaporation from the lakes' surfaces. The primary driving forces are precipitation and evaporation. Lower precipitation, leads to lower runoff from the basin; similarly, higher evaporation draws water from the lakes causing levels to decline.



The Hydrologic Cycle

Source: *Living with the Lakes*, U.S. Army Corps of Engineers; Great Lakes Commission, 1999.

## Who is Affected by Fluctuating Lake Levels?

Record high water levels of 1986 affected many residents and business located both along the rivers that provide water to the lakes and the lakes' shoreline. In 1986, the Tittabawassee River basin, which eventually empties into Lake Huron, endured an extraordinary amount of rainfall in a short period of time (up to 14 inches in 12 hours) resulting in flooding. Heavy river flooding does not only cause property damage to businesses and residents, but water that runs off the land carries pesticides and nutrients with it. The quality of the runoff water may affects the riverine and lakeshore ecosystems.

Water levels during the recent low episode (1998–2004) affected many interests, including commercial navigation, recreational boating, marinas, beaches, fishing,



Photo by Greg Lang.

Low lake levels at Old Mission Point lighthouse in Lake Michigan in 2001.



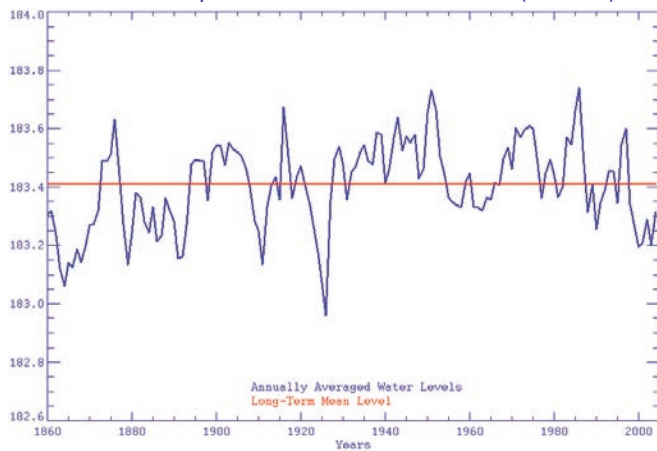
High lake levels on Lake Michigan in 1986 caused severe erosion.

cottage and homeowners, and the aquatic ecosystem. For example, in the year 2000 the Lake Carriers that transport iron ore, coal, grain, and other raw cargoes were forced into "light-loading," carrying 5-8 percent less goods, sending prices higher. Additionally, marinas spent millions to dredge boat slips, channels, and harbors along Great Lakes coasts. Nuclear and hydropower plants that use Great Lakes water for cooling and energy generation, respectively, either spent millions of dollars to relocate their cooling pipes or didn't generate enough power to meet customers demands.

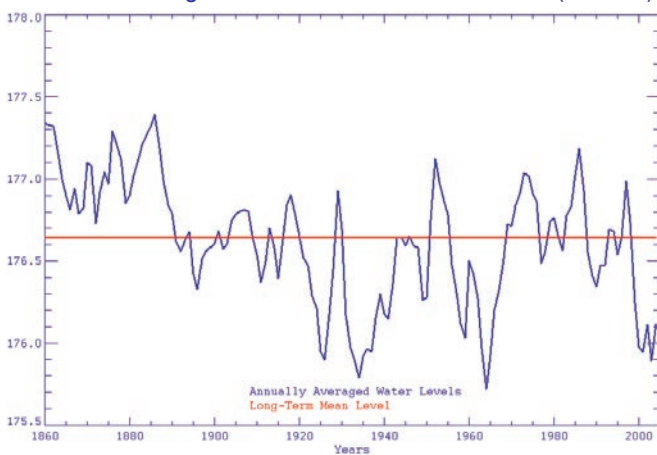
## What are the Present Conditions?

The following four graphs show annually averaged water levels for lakes Superior, Michigan-Huron, Erie, and Ontario; they are updated through 2004. From 1965 to 1997, all of the lakes were mostly above their long-term mean level. In 1998, the lakes fell sharply to below their long-term mean levels. Presently, the 2005 water levels are above the water levels of the year 2004.

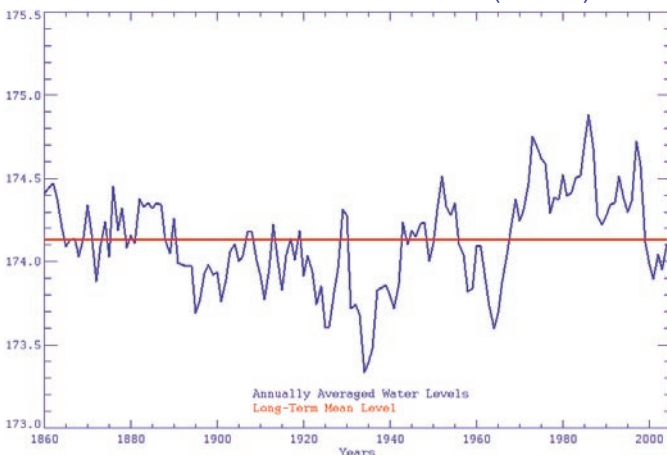
Lake Superior Water Levels in Meters (IGLD85)



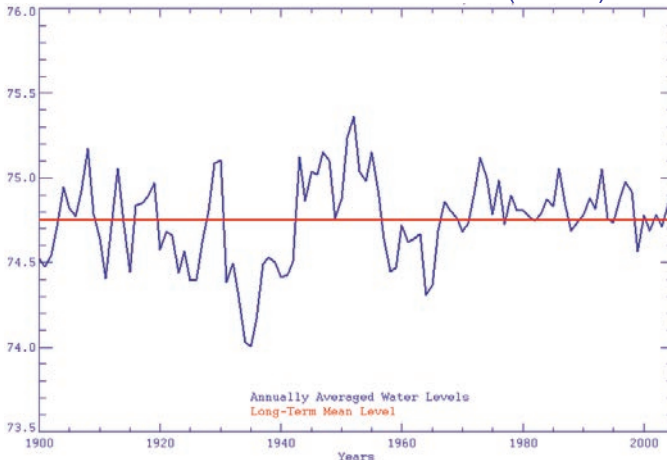
Lake Michigan-Huron Water Levels in Meters (IGLD85)



Lake Erie Water Levels in Meters (IGLD85)



Lake Ontario Water Levels in Meters (IGLD85)

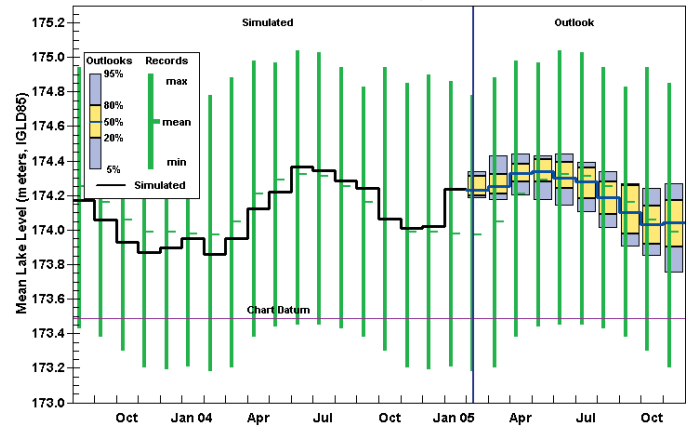


## What is the Outlook?

GLERL has the ability to make water supply and lake level forecasts 1–12 months into the future based on present basin hydrological conditions combined with NOAA's long-term climate outlooks. As shown below, water levels for 2005 are expected to remain at or slightly above last year's levels.

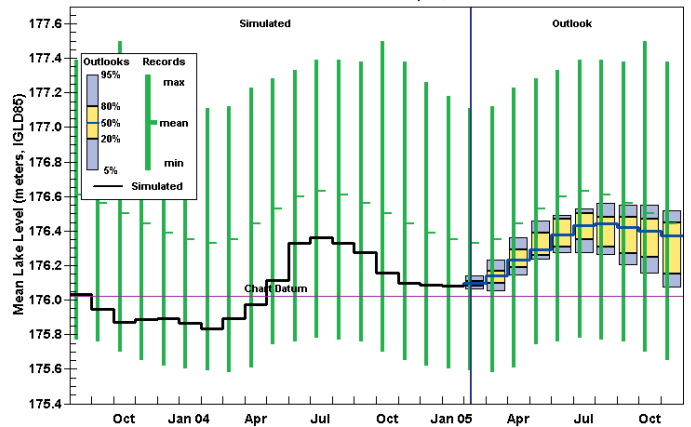
Lake Erie Mean Lake Level (meters, IGLD85)

Forecast Start Date: February 10, 2005



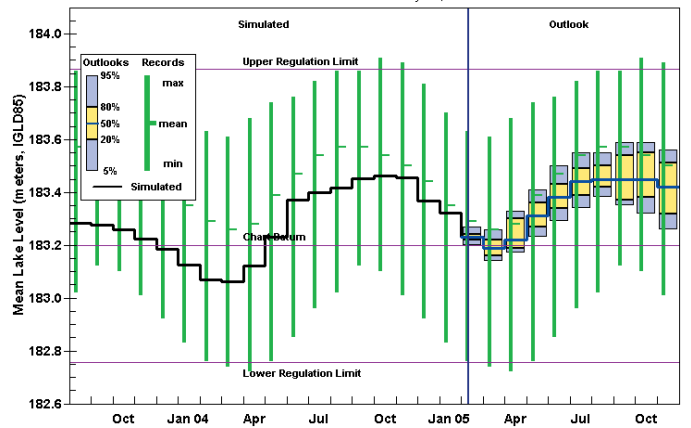
Lake Michigan-Huron Mean Lake Level (meters, IGLD85)

Forecast Start Date: February 10, 2005



Lake Superior Mean Lake Level (meters, IGLD85)

Forecast Start Date: February 10, 2005



For further information, visit our web site at [www.glerl.noaa.gov](http://www.glerl.noaa.gov), or contact us by phone at 734-741-2235. Free copies of this publication can be obtained by contacting Information Services at [pubs.glerl@noaa.gov](mailto:pubs.glerl@noaa.gov).